

**Appl. No.** : 10/822,424  
**Filed** : April 12, 2004

### **REMARKS**

Claims 1-22 were pending prior to the amendments herein. Claims 1, 3-7, 13, and 16-18 are amended herein. Claims 2, 8-12, 15, and 19-22 have been canceled without prejudice. New Claims 23-34 have been added. Claims 1, 3-7, 13, 14, 16-18, and 23-34 are therefore pending.

#### **Priority**

Applicants have amended paragraph [0003] of the specification to correct an inadvertent error. While originally claiming priority to U.S. Application Serial No. 09/685,934, the original priority claim inadvertently failed to mention that application's claim of priority to U.S. Application Serial No. 10/302,213. Accordingly, the Applicants have amended paragraph [0003] to clarify that the present application claims priority to U.S. Application Serial No. 10/459,321, which was pending when the present application was filed and which was timely filed on June 10, 2003 as a proper continuation of U.S. Application Serial No. 10/302,213, which was timely filed as a proper continuation of U.S. Application Serial No. 09/685,934, which was timely filed as a proper non-provisional of U.S. Provisional Application Serial No. 60/190,023, thereby completing the priority chain between the present application and U.S. Provisional Application Serial No. 60/190,023, which was filed on March 17, 2000.

#### **Specification Amendments**

The Applicants have amended paragraphs [0001]-[0004], [0012], and [0015] to update the status of the applications and to correct obvious grammatical and typographical errors. The Applicants submit that no new matter is added by these amendments.

#### **Claim Amendments**

The Applicants have amended Claims 1, 3-7, 13, and 16-18 to recite further structural details of the apparatuses illustrated in Figures 12A-17 of the present application. The Applicants submit that these amendments are fully supported by the application as filed and that no new matter is added by these amendments. For example, see especially ¶¶ [0090]-[0105] and Figs. 12A-17 of the present application.

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#### **Response to Rejection Under 35 U.S.C. § 112, ¶ 2**

Claim 18 is rejected under 35 U.S.C. § 112, ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention. Specifically, the Office Action states that it is unclear if the multiple electrodes and isolators, forming the two different groups in the electrode assembly, are the same as those recited in Claim 13. Claim 18 has been amended to clarify that the rate of electropolishing is configured to be different in the first zone and the second zone. Therefore, the Applicants respectfully request that the Examiner withdraw the rejection of Claim 18.

#### **Response to Rejections Under 35 U.S.C. § 102**

Claims 1 and 2 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent Publication No. 2001/0007306 to Ichinose et al. The Applicants respectfully submit that the present rejection is overcome because Ichinose fails to teach or suggest, either expressly or inherently, all of the features of the claims as amended.

##### Claim 1

The Applicants submit that Ichinose does not teach or suggest all of the features of the electropolishing system recited by amended Claim 1:

1. An apparatus for electropolishing a conductive layer on a wafer using a solution, the apparatus comprising:

- an electrode assembly configured to be immersed in a solution and configured to be positioned proximate to a conductive layer on a wafer in contact with said solution, the electrode assembly configured to have a longitudinal dimension extending to at least a periphery of a wafer, the electrode assembly including:

- a first elongated contact electrode;
- a first isolator including a side adjacent to the first elongated contact electrode;
- a first elongated process electrode including a side adjacent to an opposite side of the isolator, the first isolator protruding above top surfaces of the first elongated contact electrode and the first elongated process electrode;
- a second elongated contact electrode;
- a second isolator including a side adjacent to the second elongated contact electrode;
- a second elongated process electrode including a side adjacent to an opposite side of the second isolator, the second

isolator protruding above top surfaces of the second elongated contact electrode and the second elongated process electrode; and

a third isolator between a side of the first elongated process electrode and a side of the second elongated process electrode, the third isolator protruding above the elongated contact electrodes and the elongated process electrodes, wherein the first elongated contact electrode, the first isolator, the first elongated process electrode, the second elongated contact electrode, the second isolator, the second elongated process electrode, and the third isolator are fastened together by at least one fastener; and

a voltage supply configured to apply a potential difference between the contact electrodes and the process electrodes to electropolish the conductive layer on the wafer, wherein the isolators are configured to prevent the contact electrodes and the process electrodes from physically contacting said wafer.

For example, Ichinose does not teach or suggest a second elongated contract electrode, as recited by amended Claim 1 (emphasis added). Ichinose teaches an etching electrode 111 consisting of a single working electrode 112, a single auxiliary electrode 113, and an insulator 114 between the working electrode 112 and the auxiliary electrode 113. See Ichinose at ¶ [0042] and Fig. 1C. Ichinose teaches that the working electrode 112 is *patterned* to control electrolytic etching, and thus teaches away from the use of an additional contact electrode.

Therefore, the Applicants submit that amended Claim 1 is not anticipated by Ichinose. The Applicants respectfully request that the Examiner withdraw the rejection of Claim 1.

#### Claim 2

The rejection of Claim 2 is moot in light of the cancellation of that claim.

### **Response to Rejections Under 35 U.S.C. § 103**

#### Claims 3-9 and 13-21

Claims 3-9 and 13-21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ichinose in view of U.S. Patent No. 6,395,152 to Wang. The Applicants respectfully traverse the present rejection because Ichinose, either alone or in combination with Wang, fails to teach or suggest all of the features of the rejected claims.

#### Claim 8, 9, 15, and 21

The rejections of Claims 8, 9, 15, and 21 are moot in light of the cancellation of those claims.

Claims 3-7

As described above, amended Claim 1 is patentable over Ichinose. Claims 3-7 depend from Claim 1. Thus, Claims 3-7 include all of the features of amended Claim 1 and recite unique combinations of additional features not taught or suggested by the cited references. Wang does not make up for the deficiencies of Ichinose because Wang at least does not teach or suggest a second elongated contact electrode. Rather, Wang teaches a single contact electrode (not labeled) that physically contacts the wafer 31 and that is disposed above section walls 101, 103, 105, 107, 109. See Wang at col. 10, ll. 41-45 and Fig. 7B. Accordingly, Wang also does not teach or suggest that the section walls 101, 103, 105, 107, 109 protrude above the top surface of the electrode that physically contacts the wafer 31. Therefore, the Applicants respectfully request that the Examiner withdraw the rejections of Claims 3-7.

Claim 13

The Applicants submit that Ichinose, either alone or in combination with Wang, does not teach or suggest all of the features of the electropolishing system recited by amended Claim 13:

13. A system for electropolishing a conductive layer on a wafer using a solution, the system comprising:

- a workpiece holder configured to hold a wafer and to expose a conductive layer on said wafer to a solution;

- an electrode assembly configured to be immersed in said solution, the electrode assembly configured to be positioned proximate to the conductive layer and configured to extend past a periphery of the wafer, the electrode assembly including:

- a plurality of elongated contact electrodes configured to receive a potential;

- a plurality of elongated process electrodes alternately interposed among the plurality of elongated contact electrodes, each elongated process electrode configured to receive an opposite potential;

- an insulation separating each of the elongated contact electrodes from adjacent ones of the elongated process electrodes; and

- a plurality of compressible strips disposed above the each of the insulation members and between each of the elongated contact electrodes and the elongated process electrodes, top surfaces of the compressible strips being substantially coplanar; and

- a voltage supply configured to apply a potential difference between at least some of the contact electrodes and at least some of the process

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electrodes to electropolish the conductive layer on the wafer, the insulation members configured to electrically insulate the plurality of elongated contact electrodes from the plurality of elongated process electrodes during application of said potential difference.

For example, as described above, Ichinose does not teach or suggest a second elongated contact electrode, and thus does not teach or suggest a plurality of second elongated contact electrodes, as recited by amended Claim 13 (emphasis added). Wang does not make up for the deficiencies of Ichinose. As described above, Wang at least does not teach or suggest a plurality of elongated contact electrodes. Rather, Wang teaches a single contact electrode (not labeled).

Therefore, the Applicants submit that amended Claim 13 is patentable over Ichinose, either alone or in combination with Wang. The Applicants respectfully request that the Examiner withdraw the rejection of Claim 13.

#### Claims 14 and 16-20

As described above, amended Claim 13 is patentable over Ichinose, either alone or in combination with Wang. Claims 14 and 16-20 depend from Claim 13. Thus, Claims 14 and 16-20 include all of the features of amended Claim 13 and recite unique combinations of additional features not taught or suggested by the cited references. Therefore, the Applicants respectfully request that the Examiner withdraw the rejections of Claims 14 and 16-20.

#### Claims 10-12 and 22

Claims 10-12 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ichinose in view of Wang and further in view of U.S. Patent No. 5,807,165 to Uzoh et al. The rejections of Claims 10-12 and 22 are moot in light of the cancellation of those claims.

#### **New Claims**

Claims 23-34 have been added and are fully supported by the application as originally filed. For example, see ¶¶ [0090]-[0105] and Figs. 12A-17 of the present application. The Applicants respectfully submit that Claims 23-34, which depend from, and include all the features of, amended Claims 1 or 13, which are allowable as discussed above, are also allowable. Furthermore, the new dependent claims recite further distinguishing features.

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### Summary

The Applicants respectfully submit that all of the pending claims are allowable. The Applicants respectfully request that the Examiner withdraw the rejections and pass Claims 1, 3-7, 13, 14, 16-18, and 23-34 to allowance.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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